

GCE

Edexcel GCE

Statistics S2 (6684)

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Mark Scheme
(Results)

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6684 Statistics S2
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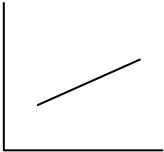
Question Number	Scheme	Marks
1.(a)	Saves time / cheaper / easier or <u>A census/asking all members</u> takes a long time or is expensive or difficult to carry out	B1 (1)
(b)	<u>List, register or database of all club members/golfers</u> or <u>Full membership list</u>	B1 (1)
(c)	Club <u>member(s)</u>	B1 (1)
2.(a)	$P(L < -2.6) = 1.4 \times \frac{1}{8} = \frac{7}{40} \text{ or } 0.175 \text{ or equivalent}$	B1 (1)
(b)	$P(L < -3.0 \text{ or } L > 3.0) = 2 \times \left(1 \times \frac{1}{8}\right) = \frac{1}{4}$	M1 for 1/8 seen M1;A1 (2)
(c)	$P(\text{within } 3\text{mm}) = 1 - \frac{1}{4} = 0.75 \quad B(20,0.75)$ <p>Let X represent number of rods within 3mm</p> $P(X \leq 9 / p = 0.25) \text{ or } 1 - P(X \leq 10 / p = 0.75)$ $= 0.9861$	recognises binomial Using B(20,p) B1 M1 M1 A1 (4)

Question Number	Scheme	Marks
3.	Let X represent the number of properties sold in a week	
a)	$\therefore X \sim P_0(7)$	must be in part a B1
	Sales occur independently/randomly, singly, at a constant rate	context needed once B1 B1
b)	$P(X = 5) = P(X \leq 5) - P(X \leq 4)$ $= 0.3007 - 0.1730$ $= 0.1277$	$\text{or } \frac{7^5 e^{-7}}{5!}$ M1 awrt 0.128 A1
c)	$P(X > 181) \approx P(Y \geq 181.5)$ where $Y \sim N(168, 168)$	$N(168, 168)$ ± 0.5 stand with μ and σ M1 M1 Give A1 for 1.04 or correct expression A1 attempt correct area $1-p$ where $p > 0.5$ M1 awrt 0.149 A1
		(3) (2) (6)

Question Number	Scheme	Marks
4.	Let X represent the number of breakdowns in a week.	
a)	$X \sim P_0(1.25)$ implied	B1
	$P(X < 3) = P(0) + P(1) + P(2)$ or $P(X \leq 2)$	M1
	$= e^{-1.25} \left(1 + 1.25 + \frac{(1.25)^2}{2!} \right)$	A1
	$= 0.868467\dots\dots$ awrt 0.868 or 0.8685	A1
b)	$H_0: \lambda = 1.25; H_1: \lambda \neq 1.25$ (or $H_0: \lambda = 5; H_1: \lambda \neq 5$) λ or μ	B1 B1
	Let Y represent the number of breakdowns in 4 weeks	
	Under $H_0, Y \sim P_0(5)$ may be implied	B1
	$P(Y \geq 11) = 1 - P(Y \leq 10)$ or $P(X \geq 11) = 0.0137$	M1
	$P(X \geq 10) = 0.0318$	One needed for M
	$= 0.0137$ CR $X \geq 11$	A1
	$0.0137 < 0.025, 0.0274 < 0.05, 0.9863 > 0.975, 0.9726 > 0.95$ or $11 \geq 11$	any .allow % √ from H_1
	Evidence that the rate of breakdowns has changed /decreased	context B1√ From their p
		(7)

Question Number	Scheme	Marks
5. (a)	Binomial Let X represent the number of green mugs in a sample	B1 (1)
(b)	$X \sim B(10, 0.06)$	may be implied or seen in part a B1
	$P(X = 3) = {}^{10}C_3(0.06)^3(0.94)^7$	${}^{10}C_3(p)^3(1-p)^7$ M1
	= 0.016808....	awrt 0.0168 A1
		(3)
(c)	Let X represent number of green mugs in a sample of size 125	
(i)	$X \sim P_0(125 \times 0.06 = 7.5)$	may be implied B1
	$P(10 \leq X \leq 13) = P(X \leq 13) - P(X \leq 9)$	M1
	= 0.9784 - 0.7764	
	= 0.2020	awrt 0.202 A1
		(3)
(ii)	$P(10 \leq X \leq 13) \approx P(9.5 \leq Y \leq 13.5)$ where $Y \sim N(7.5, 7.05)$	7.05 B1
		9.5, 13.5 B1
	$= P\left(\frac{9.5-7.5}{\sqrt{7.05}} \leq z \leq \frac{13.5-7.5}{\sqrt{7.05}}\right)$	± 0.5 M1 stand. M1
		both values or both correct expressions. awrt 0.75 and 2.26 A1
	= $P(0.75 \leq z \leq 2.26)$	
	= 0.2147	awrt 0.214 or 0.215 A1
		(6)

Question Number	Scheme	Marks
6a)	$\int_1^4 \frac{1+x}{k} dx = 1$ $\therefore \left[\frac{x}{k} + \frac{x^2}{2k} \right]_1^4 = 1$ $k = \frac{21}{2} *$	$\int f(x) = 1$ Area = 1 M1 correct integral/correct expression A1 cso A1 (3)
(b)	$P(X \leq x_0) = \int_1^{x_0} \frac{2}{21}(1+x)$ $= \left[\frac{2x}{21} + \frac{x^2}{21} \right]_1^{x_0}$ $= \frac{2x_0 + x_0^2 - 3}{21} \text{ or } \frac{(3+x)(x-1)}{21}$ $F(x) = \begin{cases} 0, & x < 1 \\ \frac{x^2 + 2x - 3}{21} & 1 \leq x < 4 \\ 1 & x \geq 4 \end{cases}$	$\int f(x)$ variable limit or +C M1 correct integral + limit of 1 A1 May have k in A1 middle; ends B1√; B1 (5)
(c)	$E(X) = \int_1^4 \frac{2x}{21}(1+x) dx$ $= \left[\frac{x^2}{21} + \frac{2x^3}{63} \right]_1^4$ $= \frac{171}{63} = 2\frac{5}{7} = \frac{19}{7} = 2.7142\dots$	valid attempt $\int xf(x)$ x^2 and x^3 M1 correct integration A1 awrt 2.71 A1 (3)

Question Number	Scheme	Marks
(d)	$F(m) = 0.5 \Rightarrow \frac{x^2 + 2x - 3}{21} = \frac{1}{2}$ <p style="text-align: right;">putting their $F(x) = 0.5$</p> $\therefore 2x^2 + 4x - 27 = 0 \quad \text{or equiv}$ $\therefore x = \frac{-4 \pm \sqrt{16 - 4.2(-27)}}{4}$ <p style="text-align: right;">attempt their 3 term quadratic</p> $\therefore x = -1 \pm 3.8078\dots$ <p style="text-align: right;">awrt 2.81</p> $\text{i.e. } x = 2.8078\dots$	<p>M1</p> <p>M1</p> <p>A1</p> <p>(3)</p>
e)	Mode = 4	B1
f)	<u>Mean < median < mode</u> (\Rightarrow negative skew) Or <u>Mean < median</u>	<p>B1</p> <p>(1)</p>
	 <p style="text-align: right;">w diagram but line must not cross y axis</p>	

